Industry perspectives on supply chain curriculums in South Africa

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Abstract

The shortage of supply chain management skills in South Africa is a major constraint to sustainable economic growth and development. Academic institutions educate thousands of students every year, however the supply chain talent shortage still remains acute. This implies that not enough individuals are being trained to meet the growing demand for skills or curriculums have not evolved to meet the changing needs of the dynamic supply chain industry. The purpose of this paper is to review the skills required by the supply chain industry in South Africa and to determine whether current educational offerings are meeting these needs.

This paper provides the results from an industry survey, conducted in 2016 by the Institute of Transport and Logistics Studies' (Africa). The survey assessed skills requirements for supply chains in South Africa and also attempted to determine areas in which curriculums are not meeting industry requirements.

The findings from this research strongly indicate that current educational programmes are ill-equipped to meet the complex demands of modern supply chains. It further provides empirical evidence of the gaps within the current supply chain education programmes and suggests some educational interventions to address these in the future in order to create the types of supply chains that are needed in developing economies.

This research provides an original contribution in that it is the only regular survey which gauges industry perspectives on logistics and supply chain talent, competencies and educational interventions in South Africa.

Introduction

The shortage of skills in general and supply chain skills in particular is well documented in South Africa (World Bank, 2017; Barloworld Logistics, 2016; Department of Higher Education and Training, 2016; World Bank, 2016; World Economic Forum, 2015; Heyns & Luke, 2012; Sharp, 2011). Sharp (2011) stated that "Most economists agree that South Africa's skills shortage poses a significant limitation on the country's long-term economic growth potential. Due to a lack of needed skills, including managerial, professional and technical skills, viable economic opportunities cannot be productively tapped." In the current economy, where South Africa's economic growth is highly constrained (Focus Economics, 2017; OECD, 2017), and given South Africa's natural trade disadvantages, such as long distances to markets, it has become critical that supply chains function at high levels of effectiveness.

Despite the recognition of the importance of effective supply chains to the functioning of the economy, the supply chain skills shortage has remained acute. The World Bank suggests that these issues are structural, reflecting that the quality of primary education is rated at 127 out of 140 countries. At higher education levels, the quality of education is ranked at 138 of 140 and the quality of maths and science education as 140 of 140 countries. Internet access in schools is rated as 119 of 140 countries. Although not solely associated with education, but considerably impacted by the quality thereof, labour productivity in South Africa is ranked at 127 of 140 countries (World Economic Forum, 2015). The implication is that the lack of appropriate skills is impacting the ability to do business within the country, as well as to trade with the country. Supply chains are inevitably affected.

To mitigate against the poor quality of primary and secondary education, tertiary institutions and private sector businesses have had to intervene with high quality services to fill the gaps left by the school system. Local availability of specialised training services is ranked at 41 of 140, the extent of staff training as 19 of 140 and the quality of management schools as 24 of 140 countries (World Economic Forum, 2015). Supply chain training is extensive with dedicated supply chain qualifications being provided by at least eight academic or technological universities, in addition to supply chain modules or courses provided by various academic and other tertiary institutions. The University of Johannesburg alone trains approximately 5000 students per annum on supply chain qualification ranging from certificates to PhDs. Professional bodies such as the Chartered Institute of Logistics and Transport (CILT), Chartered Institute of Procurement and Supply (CIPS), Association for Operations Management of Southern Africa (SAPICS) and the Council of Supply Chain Management Professionals (CSCMP) offer their own accredited certifications.

Despite the extent of supply chain training provision, the skills shortage within the supply chain industry remains acute. Noble (2015) states that about 45% South African supply chain managers admit to not having the skills they need to get the job done. This is supported by Luke & Heyns (2017) who found that 27% of practitioners found it difficult to fill operational level supply chain positions, 47% had difficulty in filling tactical level positions and 57% had problems filling strategic level positions. The difficulty in filling more senior positions suggest that the issue may be with developing the softer skills associated with higher levels of management rather than the harder skills that are taught in university and other courses. Noble (2015) suggests that the "problem is not just about the skill level of supply chain managers, but whether they have the right balance of abilities." Waller recognised this in 2012 by stating that "it's not just that we are short of people with skills, but we are short of people with the right skills …" It can thus be concluded that, for supply chains to be successful, the most appropatite skills need to developed and retained in the supply chain.

A literature analysis was conducted of contemporary supply chain research to determine the skills required by supply chain practitioners to successfully compete in a competitive global economy. For the purposes of this study mainly academic articles, but also other relevant sources (e.g. talent management opinions) were studied to obtain a broad list of skills required by supply chain practitioners. A summary of the literature review identifying the key skills are shown in Table 1 below.

Table 1 Literature review

Author	Skills items
All things supply chain (2017)	Strategic supply chain management, project management, technical knowledge, Global business leadership, integrated business, planning business communication
APICS (2014)	Performance trade-offs, warehouse management, transportation management, supply chain synchronization, risk management, sustainability, location facilities, distribution, warehousing, logistics, international regulations, strategic sourcing and supplier relationship, customer relationship management, applying lean and six sigma tools, enabling technology, math, statistics and applied science and technology, supply chain fundamentals, foundations of business management, operations and enterprise economics, Problem solving and decision making, teamwork and collaboration, accountability and responsibility, customer focus (internal and external), planning and organizing, conflict management, analytical thinking, reading and writing for comprehension, personal effectiveness competencies, awareness of the needs of others, integrity, continuous learning, effective communication, interpersonal skills, creativity
Bak & Jordan (2017)	Process management, strategic, quantitative, people management, decision-making, behavioural, negotiation
Canadian Logistics Skills Committee (2005)	Communications and analytical skills, technology, interpersonal and customer service skills
de Abreu & Alcântara (2015)	Strategic global perspective, ability to manage change processes and to balance the external needs of the function with the internal vision of efficiency, translate "client vision" into strategic and operational practices, Expertise to manage risk and uncertainty, motivate people for mutualism and cooperation, obtain positive operating performance of work teams, good communication (written and oral) to influence their subordinates and other parties related to the business (including external partners), establish metrics and reward systems aligned and coherent across functional areas.
DHL Supply Chain (2017)	Technical, analytic, leadership, strategic and critical thinking, problem-solving skills, creativity and imagination, people development/mentoring/coaching skills
Donati (2015)	Creating and communicating a vision, promoting and bringing about change, building partnerships, capturing and acting on insightful information, seizing and creating opportunity at the right place and time, consistently modelling honourable behaviour and best practices, serving the best interests of the organisation without being self-serving
Ferrari (2016)	Analytical skills, strong category knowledge, software knowledge, computer skills, understanding of finance/ cost of ownership, knowledge of global geography/ economy, written and verbal communication skills, negotiation skills, business acumen/ understanding of overall business, presentation ability/ polish, ability to forge strong relationships with stakeholders
Gammelgaard and Larson (2001)	Problem solving, decision making, teamwork, ability to see the big picture, prioritising, supply chain awareness, cross-functional awareness and written and oral communication
Gunasekaran, et al. (2017)	Supplier development, information systems, market understanding, supply chain knowledge management, performance measurement/prioritizing supply chain improvements, complexity management, inter-firm relationship skills/relationship management within process, proactive management/risk management, skills/talent management
Kisperska-Moron (2010)	Customer service required, good communications skills required for efficient coordination, good skills in fully automated information systems, critical analysis, adaptability to changing requirements and an open mind
Logistics Bureau (2016)	Information technology and automation knowledge, economics and market dynamics, understanding cost-to-serve, project management, flexibility, ability to get the best from people
Logistics Bureau (2017)	Knowledge of logistics, supply chain management and transportation, financial planning, forecasting, workflow optimization, general management and business, international business practices, knowledge of laws and regulations, mechanical, language skills

Mangan and Christopher (2005)	General skills - finance, IT and management / strategy, logistics / SCM skills - analytical, interpersonal, leadership, change management and project management skills
Mangan, Gregory and Lalwani (2001)	Communications / negotiations, computers / IT, general experience, logistics / supply chain management and people management
Material handling and logistics, n.d.	Technical competencies (enabling them to tackle, for example, complex aspects of risk management, statistical modelling, and multitier management), strategic thinking and problem solving, leadership and professional competencies (valuable in problem solving, change management, and talent development)
McAvoy (2016)	Decision making, communication & networking skills, data analytics
McCrea (2012)	Communications skills, knowledgeable in the latest technologies, relevant technical training and knowledge on industry trends
Murphy and Poist (2006)	Business skills - discipline specific knowledge, business ethics and business writing; logistics skills - customer service ; management skills - personal integrity, the ability to motivate others and decision making ability
Noble (2015)	Cross border supply chain regulation, communicating across borders, influencing senior management and working collaboratively with suppliers, communication, relationship management, negotiation and influencing skills, moral integrity, insight to see past cultural barriers when dealing with suppliers, the ability to lead change in your organisation or the power to safeguard your business's reputation for a generation
Rahman and Yang (2009)	Inventory management and transport management, supply chain awareness, cross-functional awareness, customer service, supply chain cost, ability to see the big picture, cross-functional coordination, teamwork and information flow
Razzaque and Bin Sirat (2001)	Business skills - transportation and logistics, human resource management, business ethics, general business administration and information systems, logistics skills - transportation management, customer, management skills - personal integrity, the ability to plan, the ability to adapt to change, problem solving abilities, service, inventory control and demand forecasting
Shou & Wang (2017)	Analytical skills such as data processing, demand forecasting and performance evaluation, project management, risk management, communication, leadership, coordination and negotiation, management and decision-making, professional SCM qualifications
Thai, Cahoon and Tran (2011)	Personal integrity, managing client relationships, problem-solving ability, cost control and ability to plan

Source: Compiled by authors

Research methodology

The aim of this paper is to evaluate the skills sets typically required by logistics and supply chain organisations in Southern Africa and to determine whether current educational offerings are meeting these needs. By means of a literature review of appropriate logistics and supply chain skills, an initial and broad list of important skills were identified. A selected panel of six academics and specialists in the field of logistics and supply chain management considered the initial skills list and agreed on a final list of 30 key skills that are essential to the supply chain industry

To ascertain any trends with regard to the current logistics skills requirements, a survey was conducted and 2016 at the annual SAPICS (Association for Operations Management in Southern Africa) conference. The annual SAPICS conference is seen by practitioners as the principal logistics and supply chain management conference in Southern Africa and was attended by more than 1100 supply chain management professionals. A convenience sampling approach was used, whereby responses was elicited from delegates at the SAPICS conference, who is perceived to be supply chain industry specialists.

A self-administered web-based survey containing five separate sections was utilised to collect data. Section one included questions regarding the respondent's demographic and employment related characteristics; section two asked questions regarding the difficulties in recruitment and the

preparedness of candidates; section three asked questions level of education and work experience practitioners perceive to be required for the different management levels; section four asked practitioners to rate the importance of the 30 supply chain related skills items; and finally, section five requested respondents identify strategies that would better prepare students for industry.

In the survey, respondents were requested to rate the perceived importance of the selected skills items typically required by logistics and supply chain organisations on a four-point Likert-type scale (anchored with 1 = *to no extent* and 4 = *to a large extent*). The survey were completed by 155 respondents which represent an approximate response rate of 14%, which was deemed adequate for the purposes of the study. Although the number of respondents could be viewed as a limitation of the study the researchers believe that the specific sampling pool provided an acceptable number of responses from supply chain professionals which could be seen as adequately representative of the practitioners' perspective. The survey data was analysed using SPSS for Windows version 24.

Results

The majority of the respondents are from the transport, storage and communication and manufacturing sectors (60.6%). Nearly 77% of the respondents were middle and senior managers, hinting that they can be considered as the decision-makers within their individual organisations.

The average work experience of the respondents was over 16 years, with the average experience in the area of logistics and supply chain management being over 8.5. More than 90% of the respondents have attained tertiary qualifications. To assess the internal consistency and the reliability of the measurement scale, Cronbach's α value was determined. The overall Cronbach's α value for all the skills items was 0.950, which suggests that the survey is very reliable (Field, 2013)

Based on the broad list of skills identified in the literature review, 30 logistics and supply chain skills were selected and respondents were asked to rate the importance of these skills when recruiting employees. The mean and standard deviation were calculated to derive the descriptive profile of the skill items, thus establishing the ranking of the skills in terms of their perceived importance and is depicted in Table 2. The results indicate that the top ten highest ranking skills comprise mostly 'softer' (i.e. Behavioural/ Interpersonal) and very broad management skills (i.e. General Management). The highest ranked Logistics Awareness skills in the top ten list were the 'Ability to see the big picture' and 'Customer focus'.

Table 2 Ranking of sills items

| Rank	Skills Item	Mean	Std. Dev	Rank	Skills Item	Mean	Std. Dev
1	Problem solving	3.67	.563	16	Motivation skills	3.33	.682
2	Ability to see big picture	3.64	.558	17	Knowledge of the industry	3.32	.719
3	Team work	3.63	.550	18	Negotiating skill	3.31	.770
4	Communication skills	3.62	.588	19	Change management	3.30	.801
5	Ability to plan and prioritise	3.61	.623	20	Demand forecasting	3.30	.767
6	Business ethics	3.60	.625	21	Quantitative and/or statistical skills	3.28	.752
7	Ability to think outside the box	3.57	.639	22	Quality management	3.26	.727
8	Decision making	3.54	.610	23	Transport management	3.26	.737
9	Customer focus	3.53	.653	24	Supply chain design	3.24	.750
10	Business process improvement	3.46	.632	25	Procurement/Purchasing	3.20	.762
11	Cross-functional coordination skills	3.45	.682	26	Reverse logistics	3.20	.744
12	Leadership	3.39	.675	27	Spreadsheet abilities	3.20	.780
13	WHS/MH management	3.37	.651	28	IT skills / software knowledge	3.14	.754
14	Supply chain cost knowledge	3.34	.732	29	Laws & regulations	3.09	.774
15	Inventory management	3.33	.711	30	Green logistics/ environmental	3.05	.756

The respondents were also requested to indicate the level of education they believe to be required at various employment levels (i.e. operational, tactical and strategic). This is depicted in Figure 1. The results indicate that practitioners are of the opinion that some education is important at all levels. As the requirements for tactical and strategic level positions increase, tertiary education becomes more imperative. Practitioners think a certificate or diploma is the needed tertiary qualification to obtain an entry level or operational level position. For tactical level positions practitioners place a higher premium on bachelor. For strategic level positions, the majority of practitioners indicated that at least an honours degree is required.

Figure 1 Practitioners' educational requirements
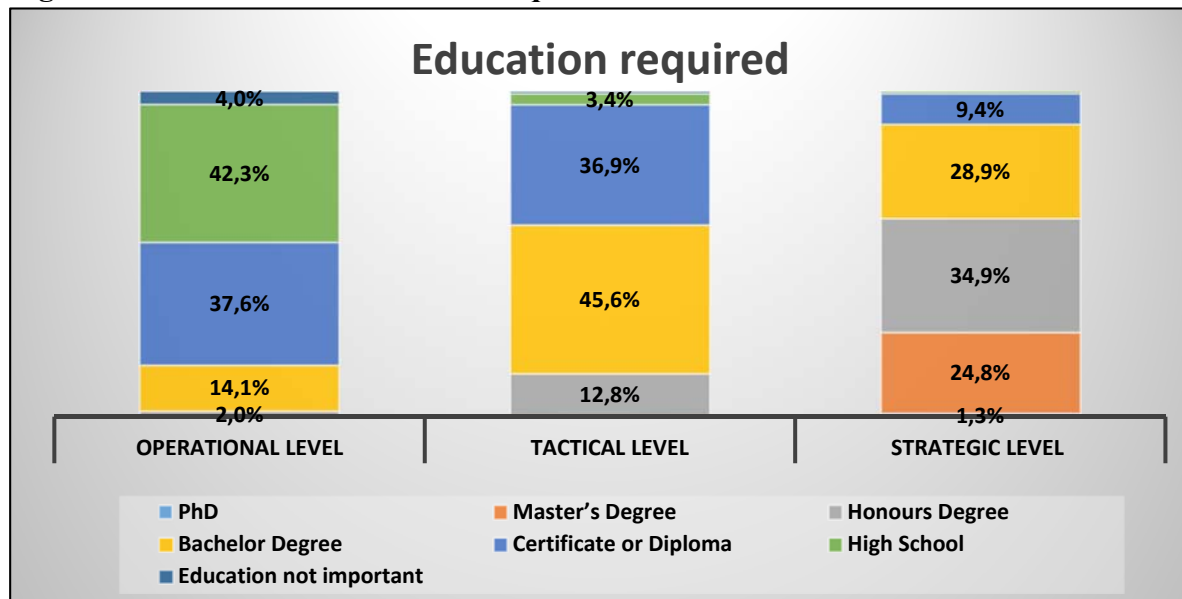
The respondents were also requested to indicate the work experience they believe is required at the various employment levels. This is shown Figure 2. The results show that work experience, at all managerial levels, is important but more so at strategic level. The majority of the respondents (67%) are of the opinion the at least 5 years work experience is required to function at the strategic management.

Figure 2 Practitioners' work experience requirements
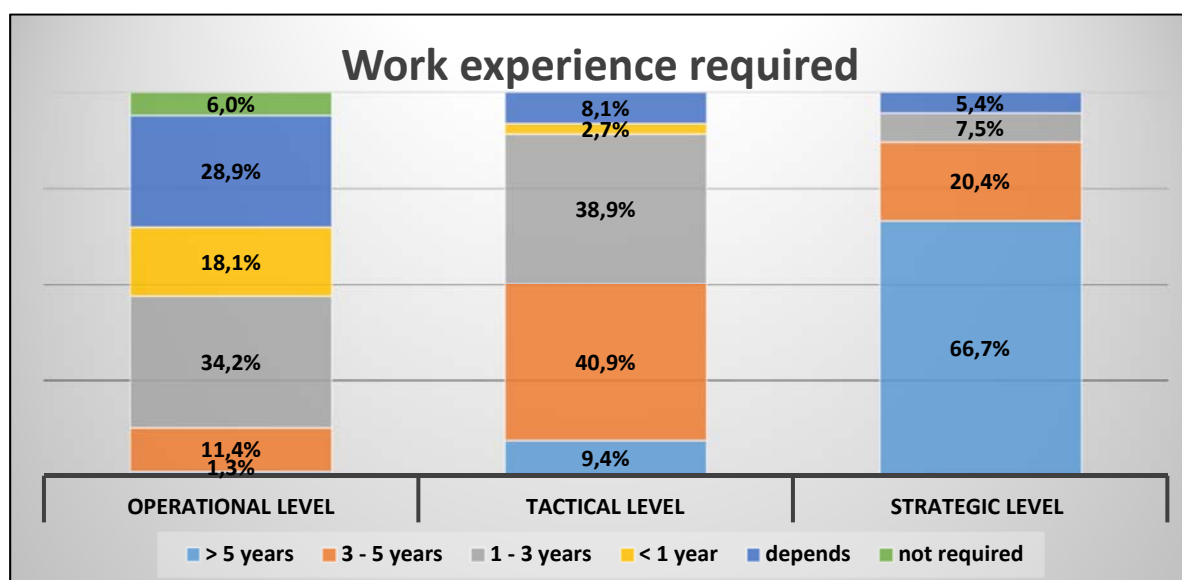
As indicated earlier, practitioners find it difficult to find suitable candidates to fill tactical and strategic level positions. This is amplified by respondents indicated that supply chain education are not adequately preparing students for employment in the supply chain industry. When asked indicate those areas of competencies were students are well-prepared, respondents generally indicated that candidates do not have adequate levels of preparation in most of the "hard" and "soft" skills areas. This suggests that current supply chain education offerings is clearly failing to meet the technical and 'soft skills' requirements. The results are indicated in Figure 4.
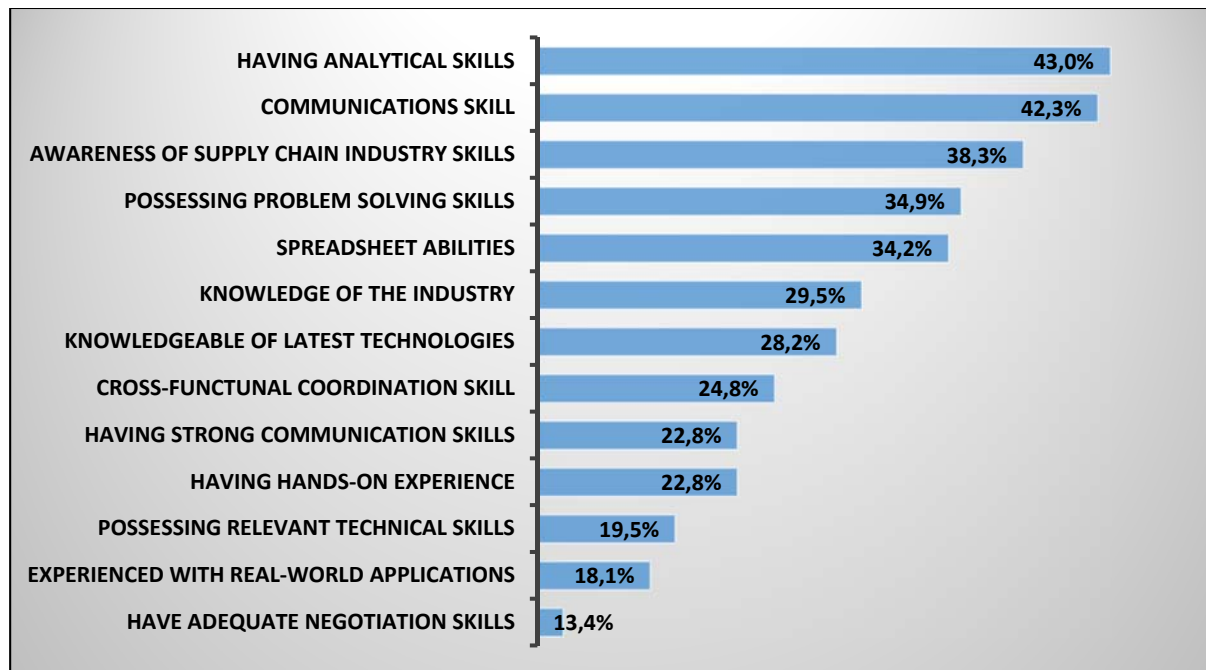

Figure 4: Competency of students

When asked what universities could do to better prepare students for a career in the supply chain industry, practitioners indicated a strong need for additional practical application. The three highest suggested solutions supports more practical exposure, i.e. more hands-on experience; interaction with practitioners and industry thought leaders and exposure to real-world examples through case study teaching. This is depicted in Figure 5. These findings supports the results presented on required work experience (see Figure 2) where practitioners revealed a much higher need for work place experience. Furthermore, the practitioners also indicated the need to develop soft skills which corroborate the finding that soft skills are those most sought after by supply chain practitioners in South Africa (see Table 2).

Conclusion

The purpose of this paper was to assess the skills that industry practitioners perceive as important within South African supply chains. Additionally, the educational and experience levels required to function appropriately at varying employment levels were considered. The final analysis sought to determine whether educational programmes are providing the skills necessary to function effectively within the country's supply chains. In the first analysis regarding the skills required for effective supply chains, South African practitioners clearly indicated that, whilst hard skills remain important, to compete within global supply chains, emphasis should be placed the development of those soft skills that are typically required in supply chains, i.e. the skills that assist practitioners to manage supply chains that cross borders, disciplines and company boundaries. The practitioners also indicated that high levels of education and work experience were required to fill higher level positions. Although this result is expected, it is also provides an indication of the belief that skills required to function in higher level positions in the supply chain are gained through high levels of education, but more particularly, that high levels of experience are required to gain the "big picture" management skills that supply chains

typically require. Organisations are increasingly seeking better qualified and more experienced resources to fill managerial posts. The implication is furthermore that incumbents are underequipped to perform at an appropriate level in their current positions. This suggests that existing supply chain education programmes are not providing candidates with the required technical and "soft" skills as well as practical experience demanded from modern supply chains. This is supported by the industry indication that candidates need to be better prepared in almost all disciplines required for effective supply chain practitioners. This research thus suggests that, if supply chains are to be created that can enhance global competiveness and sustainability, supply chain education must be relevant. This implies a review of existing service offerings and consideration of the inclusion of "soft" skill teaching and practical work experience. Further research should therefore be focussed on methods to incorporate these aspects into university and other trainings institutions' curriculums. It is suggested that failure to adapt education to modern supply chain requirements will restrict South African supply chains to being less than competitive in a globalised economy. From a training perspective it is thus clear that "soft" skills need to cater for in curriculum design. The ability to function within an industry which crosses cultural and organisational boundaries requires skill sets that transcend the skills that are taught within the traditional South African supply chain curriculums. For hard skills, emphasis should also be placed on skills that are more cross-cutting, such as analytical skills, industry awareness, etc. Curriculums in supply chain teaching in South Africa will need to be adapted to avoid silo approaches to supply chain elements and focus on cross-functional issues within the broader supply chain context.

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